Impact of winter cover crops on soil quality and weeds in organic cropping systems

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Winter cover crops and their combination with composted cattle manure have shown significant influence on soil quality and weeds in five-field crop rotation (barley undersown with red clover – red clover – winter wheat – pea – potato) of three organic cropping systems. The control system just followed rotation. In the second and third organic systems the winter cover crops were used: after winter wheat mixture of winter oilseed-rape and winter rye; after pea – winter oilseed rape and after potato – winter rye. In third system additionally, composted cattle manure was given (for cereals 10 t ha-1 and for potato 20 t ha-1). Organic carbon content increased significantly in systems with winter cover crops (1.57 %) in comparison with control system (1.51 %). That enhanced the biological activity of soil – increased number of collembols and soil microbial hydrolytic activity. Soil life activation was correlated with better formation of plant nutritional elements. For example, especially increased Ca and Mg content, according to systems 1397; 1432; 1474 and 160; 172; 195 mg kg-1. Soil pH KCl increased from 5.95 in control system to 6.03 in systems with cover crops, soil structure also improved. After the second rotation, the best soil quality with good structure and the highest content of nutritional elements was reached in system where winter cover crops in combination with composted cattle manure were used.

Winter cover crops depressed also weeds. In systems with winter cover crops the biomass of weeds was lower in spring before cover crop incorporation to soil as well as before main crop harvest in summer. Weed suppression was depending on cover crop species. In all years the winter rye was the best suppressor of weeds compared to other winter cover crops.

During two rotations, in years 2012-2017, this study was carried out and supported by ERA-Net Core Organic projects TILMAN-ORG and FertilCrop.